

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of driving an electromagnetic pump ~~that conveys~~
, the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger
including a permanent magnet inside the cylinder; ~~and~~

passing a current through an aircore electromagnetic coil fitted around the cylinder to
reciprocally move the plunger in the axial direction inside the cylinder; and

~~wherein alternately applying a pulse voltage is applied alternately~~ on a positive side and a
negative side to drive the electromagnetic coil such that a change in voltage that occurs when the
polarity of the pulse voltage is inverted has a linearly or exponentially continuous slope at least
between the positive side and the negative side.

2. (Currently Amended) A ~~The~~ method of driving an electromagnetic pump
according to Claim 1, wherein the applying step comprises applying a sinewave-shaped pulse
voltage ~~is applied~~, whose peaks are substantially flat, to drive the electromagnetic coil.

3. (Currently Amended) A ~~The~~ method of driving an electromagnetic pump
according to Claim 1, wherein the applying step comprises applying a driving voltage $V(t)$ is
~~applied~~ in a range provided by Equation (1) below where a maximum value of the driving
voltage $V(t)$ applied to the electromagnetic coil is set at V_{max}

$$0.8 \cdot V_{max} \cdot \sin(\omega t) < V(t) < 1.5 \cdot V_{max} \cdot \sin(\omega t) \dots \text{Equation (1)}$$

(where t : time and ω : angular velocity).

4. (Currently Amended) A method of driving an electromagnetic pump ~~that conveys~~
, the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger
including a permanent magnet inside the cylinder; ~~and~~

passing a current through an aircore electromagnetic coil fitted around the cylinder to
reciprocally move the plunger in the axial direction inside the cylinder;

~~wherein detecting~~ the current flowing through the electromagnetic coil ~~is detected and~~ ;
and

flowing a pulse current ~~flows~~ where a change in current that occurs when the polarity of
the current is inverted has a linearly or exponentially continuous slope at least between the
positive side and the negative side.

5. (Currently Amended) ~~A~~ The method of driving an electromagnetic pump
according to Claim 4, ~~wherein further comprising:~~

controlling the current ~~is controlled~~ so that a sinewave-shaped pulse current, whose peaks
are substantially flat, flows in the electromagnetic coil.

6. (Currently Amended) ~~A~~ The method of driving an electromagnetic pump
according to Claim 4, ~~wherein further comprising:~~

controlling a driving current $I(t)$ ~~is controlled~~ in a range provided by Equation (2) below where a maximum value of the driving current $I(t)$ that flows in the electromagnetic coil is set at I_{max}

$$0.8 \cdot I_{max} \cdot \sin(\omega t) < I(t) < 1.5 \cdot I_{max} \cdot \sin(\omega t) \dots \text{Equation (2)}$$

(where t : time and ω : angular velocity).

7. (Currently Amended) A method of driving an electromagnetic pump ~~that conveys,~~
the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger including a permanent magnet inside the cylinder ~~and;~~

passing a current through an aircore electromagnetic coil fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder; and

~~wherein applying~~ a pulse voltage ~~is applied~~ or flowing a pulse current ~~flows~~ including a period where a voltage or current value is zero when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted[.].

wherein the pulse voltage or the pulse current flows so that a minute voltage pulse of at least 30% of a maximum voltage is applied or a minute current pulse at least 30% of a maximum current flows before the period where the voltage or current value is zero.

8. (Canceled)

9. (Currently Amended) A method of driving an electromagnetic pump ~~that conveys,~~
the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger
including a permanent magnet inside the cylinder ~~and;~~

passing a current through an aircore electromagnetic coil fitted around the cylinder to
reciprocally move the plunger in the axial direction inside the cylinder[[],]; and

~~wherein applying~~ a pulse voltage ~~is applied~~ or flowing a pulse current ~~flows~~ so that an
offset voltage of no greater than 30% of a maximum voltage is applied or an offset current of no
greater than 30% of a maximum current flows when the polarity of a driving voltage or a
supplied current of the electromagnetic coil is inverted.

10. (Currently Amended) ~~A—~~The method of driving an electromagnetic pump
according to Claim 9, wherein the pulse voltage is applied or the pulse current flows so that
before a period where the offset voltage is applied or the offset current flows, a minute voltage
pulse of at least 30% of the maximum voltage is applied or a minute current pulse of at least 30%
of the maximum current flows.